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A method and apparatus are provided for reducing noise in a training signal and/or test signal. The noise reduction technique uses a stereo signal formed of two channel signals, each channel containing the same pattern signal. One of the channel signals is "clean" and the other includes additive noise. Using feature vectors from these channel signals, a collection of noise correction and scaling vectors is determined. When a feature vector of a noisy pattern signal is later received, it is multiplied by the best scaling vector for that feature vector and the best correction vector is added to the product to produce a noise reduced feature vector. Under one embodiment, the best scaling and correction vectors are identified by choosing an optimal mixture component for the noisy feature vector. The optimal mixture component being selected based on a distribution of noisy channel feature vectors associated with each mixture component.